WHAT IS CLAIMED IS:

1. An apparatus for communicating with a transponder carried by a vehicle moving along a multi-lane roadway, comprising:

transmitter means for producing a triggering signal;

an antenna system coupled to said transmitter means and having a portion driven by said triggering signal to produce a triggering electromagnetic field, said antenna system being embedded in said multi-lane roadway, said triggering electromagnetic field defining a localized transponder capture zone along said multi-lane roadway and substantially confined to one lane of said multi-lane roadway, said triggering electromagnetic field being radiated by said portion of said antenna system array for a trigger time interval for exciting a transponder within said localized transponder capture zone;

a receiver coupled to said antenna system for monitoring transponder response electrical signals from said antenna system during a transponder response time interval following said trigger time interval, said trigger time interval and said transponder response time interval defining a transponder read interval, said transponder response signals incorporating data related to the identity of the vehicle; and

means for correlating said portion of said antenna system producing said triggering electromagnetic field and said transponder response signal to associate said lane of said multi-lane roadway with each identified vehicle.

2. An apparatus as defined in claim 1, wherein said transponder response time interval is of sufficient duration to allow transponder response signals incorporating the vehicle identity data to be transmitted three times.

3. An apparatus as defined in claim 1, further comprising means for modulating said triggering signal to carry coded information to be received by the transponder.

4. An apparatus as defined in claim 1, wherein said antenna system comprises a collinear antenna array having a lengthwise substantially uniform signal distribution, said collinear antenna array being aligned essentially perpendicular to a direction of travel of the vehicle along said roadway.

5. An apparatus as defined in claim 4, wherein said collinear antenna array comprises a leaky coax antenna.

6. An apparatus as defined in claim 4, further comprising a microwave circulator connected intermediate said transmitter and said collinear antenna array, said microwave circulator cyclically controlling said transponder response cycles by conducting triggering pulses from said transmitter to said collinear antenna array for radiation of said triggering signals to said transponder and by receiving transponder signals from said collinear antenna array.

7. An apparatus as defined in claim 4, wherein said antenna system further comprises a triggering loop embedded in the roadway for radiating said trigger signals.

8. An apparatus as defined in claim 1, wherein said antenna system further comprises:

a first collinear antenna array driven by said transmitting means, said first collinear antenna array radiating said trigger pulses which are to be received by

the information and identity storage device carried on the vehicle; and

a second collinear antenna array for receiving signals from the identification and information storage device.

9. An apparatus as defined in claim 8, wherein said collinear array comprises a leaky coax antenna.

10. A fixed interrogator station for communication with a transponder associated with a moving vehicle, comprising:

a reflector shield for positioning in a roadway for receiving electromagnetic radiation from a mobile transponder associated with a moving vehicle;

a collinear antenna array positioned within said reflector shield to receive said electromagnetic radiation received by said reflector shield; and

a receiver coupled to said collinear antenna array to receive electrical energy induced in said collinear antenna array by said electromagnetic radiation.

11. A fixed interrogator station for communication with a transponder associated with a moving vehicle as defined in claim 10, further comprising a transmitter coupled to said collinear antenna array.

12. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway, comprising:

an electromagnetic wave reflector having a terminal portion defining a radiation emitting aperture, said electromagnetic wave reflector being buried in a roadway with said terminal portion being positioned

substantially flush with a vehicle carrying surface of said roadway; and

a radio antenna positioned within and substantially surrounded by said reflector so that said radio antenna is electrically isolated from said roadway and experiences substantially no loss of electromagnetic waves to said roadway, substantially all of said electromagnetic waves radiated from said radio antenna being radiated from said radiation emitting aperture.

13. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 12, further comprising a solid dielectric positioned within said reflector between said antenna and reflector.

14. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 12, wherein said radio antenna comprises a coaxial cable.

15. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 12, wherein said radio antenna comprises a collinear array antenna.

16. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 12, wherein said reflector comprises a substantially rectangular cross section trough.

17. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 12, wherein said reflector is filled with a solid dielectric.

18. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 17, wherein said radio antenna comprises a collinear array antenna.

19. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 17, wherein said radio antenna comprises a coaxial cable.

20. An antenna system for flush and recessed mounting in a roadway for radiating electromagnetic waves to and receiving electromagnetic waves from vehicles traveling on said roadway as defined in claim 12, wherein said radio antenna further comprises a loop antenna.

(Amended)

21. A method for communicating with a moving vehicle traveling in one lane on a multi-lane roadway, comprising the steps of:

producing a first triggering electromagnetic field having a field strength defining a first transponder capture region limited to a first lane of the multi-lane roadway;

monitoring a frequency of a first return information signal during a first information interval;

producing a second triggering electromagnetic field having a field strength defining a second transponder capture region limited to a second lane of the multi-lane roadway; and

SECOND monitoring a frequency of a second return information signal during a second information interval different from said first information interval; and determining that said one lane traveled by said vehicle is said first lane, when said first monitoring step receives a first return signal during said first information interval.

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22. A transponder responsive to a trigger signal and to be carried on a moving vehicle, comprising:

means for receiving electrical power;

means for receiving a trigger signal;

memory means for storing information and identity data;

protect means for protecting a portion of said memory means against accidental erasure;

means for altering at least a portion of the information and identity data stored in said memory means in response to a signal from an interrogator station;

logic circuit means for producing a code signal representing the stored information and identity data; and

transmitter means coupled to said trigger circuit means for transmitting the code signal .